

Joanna Dyduch

University of Wrocław (Poland)

Karolina Olszewska

University of Wrocław (Poland)

Israeli Innovation Policy: an Important Instrument of Perusing Political Interest at the Global Stage

Abstract: Israel is perceived in the international environment as a one of the top leaders in innovation. This is proven by the progressively high position of this country in international rankings and the participation of Israeli scientists and technologists in prestigious international programs. In this article we claim that the aims of Israeli innovation policy, which has the biggest impact on the shape and content of the innovation ecosystem, are highly politicized. The *status quo* driven by the key assumption of the state strategy, according to which obtaining a competitive predominance in the political international environment will be achieved through economic instruments, primarily technological innovation. Therefore the aim of this article is to critically analyze Israeli innovation policy and the innovation ecosystem, paying special attention to the state interest and the government activities in this realm. For the purpose of this analysis some basic assumptions of the neoliberal economy redefined by Arie Krampf will be utilized. Furthermore to better describe and explain the link between politics and economy in the Israeli innovation ecosystem we will refer to the K.N. Waltz considerations on mechanisms of the political and economic system in a globalizing world.

Keywords: *Israel; Israeli innovation policy; innovation ecosystem; technology and science; hi-tech; research and development (R&D); international-political competitiveness*

Introduction

There is no doubt that the history of Israeli innovativeness is a success story. Just to mention the Global Competitiveness Report 2017–2018, where Israel has reached 3rd place in terms of innovation and 16th position in a general assessment of competitiveness (out of 137 economies covered) (World Economic Forum, 2018). The country also has obtained 17th

position (out of 127 economies) in the Global Innovation Ranking 2017 (Cornell University, INSEAD, and WIPO 2017, p. 238). This same report classifies Israel as in 1st place in researchers, venture capital deals and global expenditures on R&D (GERD) performed by business, and research talent in business enterprise. It also gains 3rd position on expenditure in R&D and 1st place in industry research collaboration and ICT services export (Ibid., p. 40).

Obviously, the source of such a situation is to be found in the construction of the national innovation system, where effectively organized relations between scientific and research institutions, the industrial sector and business and public institutions play a key role. Here, State institutions play an extremely important, one could say pivotal, role being constantly interested and active in supporting and moderating the Israeli innovations ecosystem. For the current government (as well as the previous ones) Israeli innovativeness is a powerful diplomatic tool. As B. Netanyahu putted it “economic dynamism can help make friends as well as fortunes” (2018). In other words, innovative, economic competitiveness has brought Israel many new partners and allies and became a crucial element of Israeli diplomacy. Therefore, this paper seeks to contribute to the ongoing debate on innovative economies in the era of national states revival (e.g.: Hall & Rosenberg, 2010; Casadella et al., 2015, Edler & Fagerberg, 2017), which will, most probably, be developing rapidly. It aims also to bridge the highly politicized aspects of the Israeli innovation policy development with its market and industry oriented elements.

Surprisingly, so far there is not much literature on the given topic, either from the more economic point of view or the political science and/or international relations perspective. However, Israel tends to serve more and more often as an interesting example and case study (Paredes-Frigolett & Pyka, 2017; Edler & Fagerberg 2017) of how the contemporary innovation ecosystems work also in comparative studies (Frenkel, et al., 2003; Breznitz, Ornston 2012; Rubin, et al., 2015). So, there is also an extending discussion on the mechanism of the Israeli economic system innovativeness, where authors are trying to follow and explain the evolutionary development of the innovation ecosystem in Israel (Spiegel, 2013; Rubin et al., 2015). A comprehensive, and relatively new, study on Israeli innovations presents a report titled *Mapping Research and Innovation in the State of Israel* (UNESCO, 2016). Previously, an analytical work on this topic had also been done by the Israeli Samuel Neaman from the Institute for National Policy Research (Frenkel, et. al 2011). In academic debate, some attention is being given to the financial mechanism of the Israeli innovative ecosystem, especially to the importance of the availability of venture capital (Wonglimpiyarat, 2015, 2016).

As mentioned above the main goal of this article is to critically analyze Israeli innovation policy and to describe and explain mechanisms and processes typical for the Israeli innovation ecosystem. We will try to find out what are the expected, and the side effects of the Israeli strategy of becoming a global innovative player. We will look at the importance of international economic and political cooperation for innovativity, bearing in mind the nature and substance of the Israeli economic system characterized by A. Krampf as an ‘nationalist’ or ‘hawkish’ neoliberalism (Krampf 2018). In his newly published book titled

Israeli Path to Neoliberalism. The State, Continuity and Change, Krampf refers to the category of 'geopolitics' by mentioning the importance of the linkages between the Israeli foreign and economic policy and the "geopolitical conditions in the Middle East" or the "geopolitical vision" of Israeli politicians and economists. In short, domestic economic policy is strictly linked with Israeli foreign policy and one serves the other, being interconnected elements of a systemically ordered and organised environment.

Moving on, it can be said that the world economy is a constitutive element of the international environment, by many scholars perceived through the lens of systemic analysis. So, Israeli economy is and wants to be part of the international economic system. As PM, B. Netanyahu has argued "technology without free market does not get you very far" but even assuming that the Israeli government policy is fully coherent with the values of a free market economy (which is, to an extent true), economy remains under the influence of politics and still the governments not markets are driving and shaping the dynamic of international relations. In this light, K. Waltz correctly noted "the growth of a country's economic capability to the great power level places it at the center of regional and global affairs. It widens the range of a state's interests and increases their importance" (Waltz, 2000, p. 33). The above noted assumptions introduce us to the analysis which aims to explain the linkages between the economically granted innovation policy and Israeli political strategy.

Some theoretical and conceptual remarks

To better explain the interconnections between the international and national economic systems and political cooperation for innovativeness, as mentioned above the model of 'nationalist' or 'hawkish' neoliberalism described by A. Krampf will be employed. As Krampf claims "'hawkish neoliberalism' can be understood as a new form of neo-mercantilism", an Israeli – specific response to new domestic, international and geopolitical conditions. The 'nationalist neoliberal' vision, has been developing contrary to the 'internationalist neoliberal dovish' assumption that "the economic transition of Israel not only would make the economy more efficient, but would also pave the way to a more peaceful Middle East, based on international and regional economic cooperation and interdependence" (Krampf 2018). The core element of the 'nationalist neoliberalism' was the concept of national security. What is more, interdependence, as an international relations mechanism, wasn't seen as a source of peace and stability; it has been often identified as a threat to state security, being associated with 'political economic terror', in which Israel has been threatened with boycott and isolation. To sum up, a 'neoliberal nationalist' would believe that "national security policy strategy is accompanied by external political and economic pressure" (Krampf 2018) and therefore to confront this external pressure, Israel must have a sturdy industry and the government must support it. In other words, international economic cooperation would be a tool to pursue national interest and not at all to increase the interdependence or introduce more international rules and institutions. In this respect Israeli decision makers had to find a way

to take the respective (strong enough) position in the world economic system to strengthen its political influence and effectiveness. A highly stable economy has been perceived by the Israeli ruling elites as a pre-condition for pursuing foreign and security policies. One can say that by increasing the competitiveness and effectiveness of the Israeli economy, it was possible to decrease international political dependence, while at the same time maximize the economic benefit it can extract from international cooperation. Considering the above, we will focus on the impact of Israel innovation policy on the increasing the competitiveness and effectiveness of its economy.

The decision to promote and invest in innovative sectors of Israeli economy, based on high technologies, was taken in the mid-80's of the XXth century. Israel was one of the first countries to introduce special innovation legislation in 1984 (the Law for the Encouragement of Industrial Research and Development ("the R&D Law" later known as the "Innovation Law"). It has defined the parameters of government policy towards industrial R&D ever since. From then, the Israeli economic system has gone through serious structural changes. As a result, the Israeli economy (at least in its important piece) was transformed to become a market-knowledge based economy, driven by the private sector and characterized by a strong orientation towards international markets (UNESCO 2016, p. 12). It can be argued that reforms undertaken in Israel in the 80's and continued in the 90's of XXth century were to catch up the main stream of globalization processes, since "much of the world has been left aside". This was right in the cases of most of Africa and Latin America, Russia, a large part of Asia and all of the Middle East except Israel (...) as K. Waltz points out (1999, p. 695).

In general, the Israeli economic transformation and growth came from the strategy of becoming one of the world's leading innovators, rather than one of many imitators. It seems that at least some Israeli politicians but also other important market and academia players understood correctly the competitive nature of international system where "in political as in economic development, late comers imitate the practices and adopt the institutions of the countries who have shown the way" (Ibid.). Israelis were fully conscious that "the future belongs to those who innovate" (Netanyahu, 2018). Moreover being competitive and effective international players is not only a matter of understanding and being conscious but also most of all it is a matter of the capacity to act on this conviction. Technological innovativeness has become the core element of the strategy of capacity building.

Since this paper focuses so deeply on innovations, it is worthwhile to agree upon a certain and clear definition of the given term, which has recently become highly popular and therefore very often used in the public discourse by politicians, journalists and commentators in different contexts, carrying sometimes various meanings. In this paper the term will be strictly related to the technological innovations¹, which, in the case of Israel, plays the

¹ The term 'technological innovations' comprises new products and processes and significant technological changes of products and processes. An innovation has been implemented if it has been introduced on the market (product innovation) (Frascati, 2015).

most prominent role in the Israeli innovation ecosystem and furthermore in the country's economic system. As described in the next section, the Israeli economic system consists of a relatively small, but excellent, high-tech sector, which serves as an engine of the Israeli economy; but it also contains a much less effective, and much larger traditional industry and service sector (UNESCO 2016).

In this respect *innovation policy* can be defined as a set of policy instruments and appropriate institutions that assist in the adoption of technologies and the introduction of new goods and services to the market (UNESCO 2016, p.24). Following that, while analyzing the dynamics of the national innovation ecosystem, it is important to stress the relationships among the actors and institutions which facilitates the economic development and growth. The system itself is composed of state institutions, scientific and research units (academia) and private and public firms representing the business and industry sector, aimed at “production, diffusion and exploitation of knowledge” for economic, social and also political purposes (Wonglimpiyarat, 2016, p. 20). Considering such a systemic approach is necessary to better understand the factors and conditions of state authorities activity aiming to achieve national policy goals in accordance with the national interest, both in internal (national) and external (international) dimensions through technological innovation.

Israeli innovation policy – an effective model in transition

The following section aims to define and characterise the Israeli innovation ecosystem. At first, we will try to conceptualise the primary goal of Israeli innovation, by analyzing declarations and statements (legal and political). Secondly, we aim to answer the question: where are the Israeli innovations? In other words we will consider both the territorial and sectoral location of it, which should eventually lead us to better understanding of the structural and functional outlook of the Israeli innovation ecosystem, being a part of the state economic ecosystem. Consequently, we will critically analyse the declarative goals of the Israeli innovation policy in the light of its shape and content and try to assess its effectiveness by looking at its results.

What are the goals and objectives of the Israeli innovation policy?

Israel, by making strategic choices, aims at optimizing the country's position in the international environment (including in the global economy), from its own geopolitical and geo-economic constraints, has made a flywheel of its political and international economic development. Though it is a relatively small country (both in terms of territory and population), being under constant political and economic pressure from outside, it has produced more *start-up* companies than larger, more peaceful and stable nations (Senor & Singer, 2009). This should not be surprising once we acknowledge that the national innovation policy is considered especially relevant for small states, as a part of their adjustment to the

changing international, economic and technological order, and for improvement to their own economic and technological situation (Pustovrh & Jaklič 2014). However, in the case of Israel, which has already had a very advanced innovation policy and developed economy – innovativeness is perceived not as way to adjust to international order, rather to participate in the creation and shaping of it.

As Eli Cohen, the Israeli Minister of Economy and Industry, put it “in a global economy characterized by technological innovation, Israel is a key player” and one of the primary governmental policy goals is “the preservation of Israel’s leadership position in R&D, and its unique entrepreneurial culture, especially in fields at the forefront of technology (IIA, 2017b). In other words the declared objective of the Israeli innovation policy is “maintaining Israel’s position at the forefront of global innovation and elevating the entire economy through technological innovation” (IIA, 2017a;). In strategic planning of future trends and directions of social and economic development, Israel wants to focus on upgrading the economy so “the State of Israel will be among the world’s ten to fifteen leading countries in terms of income *per capita*. It will strive for the good of all its citizens, their quality of life, and that of its future generations. Israeli society (...) will rely on the cultural and scientific/technological capabilities of its people, on its wealth of human capital, and on innovation and initiative” (USISTC, 2008, p. 15). To achieve these objectives, authors of the strategic plan “Israel 2028” claim that one has to acknowledge that “the chances for Israel’s social and economic prosperity also depend to a large extent on strengthening regional trends of peace and calm, both in the immediate (Palestinian, Syrian and Lebanese) circle and in the further circle of threats from Iran and other focal points of radical, hostile Islam. The circles of economy, technology, policy and security interface with and feed each other” (Ibid). Therefore Israel should focus on optimal and successful “integration into globalization”, most of all by being a competitive player on international markets.

Summing up, the main aim of Israel’s state innovation policy, as manifested by the declarations of key policy makers, is to strengthen Israeli international political and economic influence, in combination with positive international visibility. This external policy goal has been seen as a pre-condition for internal development. In other words, the existence and survival of Israel has been, to very big extent, dependent on the external – international circumstances. Among them, two can be considered as most important: the elimination of the existential threats which were addressed from the neighbourhood and improving international recognition and legitimacy. In both cases successes in the realm of Israeli technological innovations are not only a helpful but even a necessary component of state strategy operationalization.

Where are the innovations?

The following section defines both the territorial and sectoral location of Israeli innovativeness. Moreover it aims to present the structure of Israel’s innovative sector and the

interconnectedness between civil and military industries. As for the territorial location of innovative industry, the greatest concentration of hi-tech firms can be observed in the so called 'Israeli Silicon Vadi' (usually compared to Silicon Valley in California, US). The creation of innovative clusters concentrated in the Israeli Silicon Vadi is definitely a result of politically driven decisions, rather than free market rooted dynamics (Wonglimpiyarat 2016). High concentrations of technologically innovative industry can be found in the area around Tel Aviv, including small clusters around the cities of Ra'anana, Petah Tikva, Herzliya, Netanya, the academic city of Rehovot and its neighbour Rishon Le Zion. Hi-tech clusters can be found also in northern part of Israel in Haifa and Caesarea, and in the south in Beer Sheva. Recently there were also some innovative developments in Jerusalem. Geographical proximity between the R&D centers, industrial sites and developed urban areas combined with very good home and international transport connections and facilities and with a concentration of human capital should be seen positive characteristic and an advantage of the national innovation ecosystem. On the other hand it does not help in the sustainable and inclusive development of the economic system as a whole.

As for the industry's areas and sectors where the greatest concentration of innovative solutions, *start ups* and VC investments can be observed, one can point to:

- information and communication technology sector;
- medical and pharmaceutical sector (including: medical devices);
- agriculture and biotechnology sector;
- natural resources and energy sector (with a rapidly growing renewable energy sector, and groundbreaking water technologies);

A very important component of the Israeli economic system is defense and aerospace industries, from which transfer of knowledge and advanced technologies to civilian industries takes place, permanently accelerating and enriching technological and economic development (Broude et al., 2013). This specific sector enjoys a privileged position both in terms of access to long term financing facilities and a very high level of public legitimization for the state militarization. Israel, for the past decades, has had one of the highest military burdens (military expenditure as share of GDP) in the world (Broude et al., 2013; World Bank 2018). The military industry sector is a space for the operation of around 150 firms, among which are large state owned and government controlled companies like the Israeli Aerospace Industry, Israel Military Industries, Rafael and smaller but prominent and influential private players of Israeli but also international markets e.g. Elbit System.

The phenomenon of interconnection between the level of militarization of different realms of the Israeli public sphere and technological innovativeness should be viewed through the lens of the basic needs of every state, namely the need to ensure its security. It seems that the sectoral location of Israeli innovations is a function of a specific perception of the basic goals of state policy which is ensuring existential survival and security. This is true not only when one refers to the military sector, but also other innovation sectors such as Israel nanotechnology or advanced food production or innovation in the energy sector.

Achievements in each, are important to the efforts to upgrade the level of security: social, economic, political but above all existential security.

Foundations, shape and content of the Israeli innovation policy

The legal framework of the Israeli innovation policy is created by special legislation and strategic planning. It is true that the legal infrastructure plays a key role in enabling the ongoing hi-tech revolution in Israel. However, the legislation framing and regulating the innovation ecosystem in Israel remains under the process of permanent changes. These changes are not revolutionary, rather they are evolutionary. The most relevant here is already mentioned Law for Encouragement of Research, Development and Technological Innovation in the Industry (known as an “Innovation Law”) adopted in 1984 and since then amended several times, most recently in 2015 (Lexology 2015). The subsequent changes were introduced to address the current internal and international challenges the high-tech industry faces, by creating optimal conditions for its development.

The Israeli innovation policy was to set and constantly adjust the series of systemically organized constitutive elements of innovation ecosystem and relations and interconnections between them. Israeli innovation policy is founded and based on long-lasting and advanced cooperation between state institutions, business (in the elaborated case, the innovative industry) and academia (universities and research and development centers) (Trajtenberg M.2005). No doubt the heart of the Israeli innovativeness is the high level of development of human capital (world rank 19) which corresponds with the high level of Israel’s Human Development Index (0.899) (UN DP, 2018). Looking for alternative figures representing the potential of Israeli innovation’s ecosystem in terms of human capital, one can mention the number of researchers per 1,000 employed – which is the highest in the world and in case of Israel it is over 17 (OECD 2016).

A crucial factor shaping the human capital development in Israel is its migration policy, based on the Law of Return addressed exclusively to the Diaspora Jews, combined with a well organised immigrants absorption system. Israeli authorities have been aware that among Jewish newcomers, there have been always a number of highly educated, skilled professionals. This applied especially to the Russian speakers Aliyah (also called: the 1990’s post-Soviet Aliyah). To optimally utilize the knowledge and skills of migrants, the Center for Absorption in Science under the Ministry of Aliyah and Immigrant Absorption has been established. This specific institution is to facilitate the absorption of the immigrants (or returning resident scientists) into the R&D system and academic research institutions in Israel, by using the knowledge and experience that these scientists bring with them (Ministry of Aliyah and Integration, 2018). Israel’s above mentioned immigration policy was an important component of the strategy of skills formation and utilization in the context of a larger – countrywide scale.

In addition, the Israeli authorities were interested in establishing entrepreneurial high-tech clusters and combining them with the Technological Incubators Program (TIP)² (Wonglimpiyarat 2015, p. 85). The program was launched in 1991 and in more than two decades of operating, it has established over 70 new start-ups each year. What is more, since the beginning of the program, 41% of the incubatees are still in business (Rubin et al., 2015, p. 15).

An import element of every innovation ecosystem are the R&D centers, which most often are affiliated to Universities and sometimes have the status of independent units. Israel has seven research universities: Technion – the Israel Institute of Technology located in Haifa is listed on the Academic Ranking of World Universities (the Shanghai Ranking); the Weizmann Institute located in Rehovot is known as a leading multidisciplinary research institution in the natural and exact sciences; Tel Aviv University, which is the largest academic institutions in Israel; The Hebrew University of Jerusalem; Ben-Gurion University of the Negev, located in Be’er Sheva where the Advanced Technologies Park adjacent to the university was created; the University of Haifa; and finally Ariel University based in the Israeli settlement in the West Bank. All of those institutions are conducting advanced research in the fields of: natural science, mathematics, applied science, engineering and computer science. Besides the Universities there are also seven public research institutes³. Universities as well as public research institutes cooperate closely with the industry and business sectors. The scientific research and technologies are commercialized through the university-owned technology transfer companies (TTCs). Today, many Israeli universities have entrepreneurship centers, for example, Bronica Entrepreneurship Center at Technion and StarTau at Tel Aviv University (Wonglimpiyarat, 2015, p.85). However, the Universities which have in past years transformed from “being conventional research and education hubs to being innovation promoting knowledge hubs” (Rubin et al., 2015, p. 12) are not the only source of knowledge.

The attractiveness, competitiveness and finally impact and importance of Israeli science is reflected by the number of articles by Israeli scholars published in prestigious Journals. The number of articles by Israeli scientists listed in the Science Citation Index, the Social Science Citation Index and the Arts & Humanities Citation Index shows a linear-growth over the past five decades.

² The Israeli government provides 85% for each incubatee’s funding.

³ 1. Agricultural Research Organization – Volcani Center; 2. Israel Oceanographic and Limnological Research (IOLR); 3. Israel Institute for Biological Research Applied 4. The Geophysical Institute of Israel; 5. Soreq Nuclear Research Center Conducts, 6. The Interuniversity Institute for Marine Sciences in Eilat; 7. The Fisher Institute for Air and Space Strategic Studies.

The operation of the Israeli innovation policy is based on several programs⁴, profiled adequately to the needs of its potential beneficiaries. The most significant institution responsible for implementation of state innovation policy is the Israel Innovation Authority (IIA) (which was established by the fusion of the Office of the Chief Scientist of the Ministry of Economy and MATIMOP (the Israeli Industry Center for R&D)⁵. The establishment of the IIA is an Israeli government response to the need to quickly and efficiently confront the rapidly changing needs and challenges facing the IT industry, which stem from the increasing competitiveness of the world economy. The new institutions gain greater power and flexibility to enable rapid response. On the other hand it can be said that this recent consolidation of innovation policy institutional framework was to give more power and influence to the political decision makers (or simply state institutions) over the shape and content of the policy, which should serve to achieve national policy goals. But yet the IIA advises the government and Parliament (“Knesset”) committees regarding innovation policy in Israel and furthermore monitors and analyzes the dynamic changes taking place throughout the innovation environments in Israel and abroad. These mechanisms make the process of creation and operationalization of innovation policy bidirectional, if not multidimensional since IIA agenda of action is set be a permanent and in-depth relationship with business/industry and academia. However it is true that the last word concerning the shape and content of the innovation policy and its short, medium and long-term goals belongs to the state authorities (the government).

If we take a closer look at the profile of the ongoing programs launched by the IIA we can have a better sense of the preferences and priorities of the Israeli government with respect to directions of development of innovation policy. The strategic programs and initiatives are designed to strengthen the Israeli position in the technologically-specialised sectors of the global economy. What is more, they reflect existential needs of the state itself. As a representative example one can point to the KIDMA2.0 program which aims to promote Israeli industry in the field of cyber security.

Key mechanism of Israeli innovation policy

The topic of the conceptualization and classification of Israeli innovation policy instruments and mechanisms has already been touched upon above. It's also worth underlining that this

⁴ Israeli innovation policy programs dedicated to develop technological infrastructure: MAGNET, MAGNETON, NOFAR, TZATAM, KAMIN, MEIMAD, Industrial Research Institutes, MIDGAM Bank, KIDMA2.0.

⁵ Beside the IIA, there are in Israel other public/state institutions involved in formulating and/or implementing innovation policy. At first it is the Ministry of Science, Technology and Space, the Ministry of Finance and finally the Planning and Budgeting Committee of the Council for Higher Education which promotes and allocates funding for scientific research in the academic sector.

specific issue could become a theme for separate analyses, but here we only point out the two most relevant⁶ mechanisms. One is the mechanism of broadly defined internationalization of innovation policy and the second, to a big extent connected to the first, is market oriented liberal, economic policy availability of venture capital (VC).

As for the internationalization of Israeli innovations and connecting the Israeli economy with the global innovation industry, it is being done firstly through initiating and establishing international agreements with countries and multinational corporations (IIA 2017a). This helps to deepen the bilateral relations between Israel and selected (mostly the most economically advanced and politically powerful) countries in the world. Israel has also four binational funds, with countries that are highly advanced in the field of innovation and R&D (US, Canada, South Korea and Singapore). The longest and the richest history is that of the Israeli-US R&D cooperation. In 1977 both state governments established the Israel-U.S. Binational Industrial Research and Development Foundation (BIRD) which aimed to stimulate, promote and support industrial R&D of mutual benefit to the U.S. and Israel. Since its inception in 1977, BIRD has approved over 950 projects with leading companies in the U.S. (e.g.: Bayer Pharmaceutical, Eastman Kodak, General Dynamics, IBM, Motorola, Procter & Gamble, SanDisk, Spansion, Telcordia). Israel – U.S. cooperation in the field is also facilitated by the Binational Science Foundation, the Binational Agriculture Research and Development Fund and the U.S. – Israel Science and Technology Foundation. Such cooperation is not only a matter of knowledge exchange or a business transaction, (see more and compare: Spiegel, 2013, p.4); it is based on a politically rooted mutual understanding of each partner's interest. In both cases, the national pragmatic interest which stands behind the R&D cooperation is strongly connected with geopolitical needs and ambitions. This applies especially to cooperation with North America. Moreover, the international cooperation, which has become the top priority of the strategy of the analyzed policy, has resulted in Israel increasing international research grants co-authorship. Individual Israeli scholars and research institutions have successfully became part of international research teams and consortia. Just to mention, Israel was the first non-EU country to be associated to the EU Framework Programme back in 1996. Since then over 3,000 projects submitted by Israeli entities have been approved involving 4,435 participants (of these, 2,450 were academic researchers, 1,270 were industrial researchers, and 715 researchers from other sectors) (European Commission, 2018).

But yet there is also a deeper geopolitical sense in Israel's new foreign relations with non-Western regions/states (e.g. South Korea, Singapore and also China and India). This new phenomenon can be seen as attempt to multiply and diversify the desired Israeli diplomacy goals. By gaining new partners and creating new forms of beneficial cooperation (joint innovative projects such as a wave energy power station in cooperation with Indian

⁶ The estimation of relevance of pointed mechanisms was based on critical analysis of primary sources and literature.

business conglomerate Shapoorji Pallonji in Ghana or lunching the first Israeli University in China:Guangdong (Technion Israel Institute of Technology), Israel is trying to balance traditional foreign policy connections by increasing its importance and influence (Technion 2018, Israel21 2018). This balancing and diversification strategy is related to the neorealist vision (Waltz, 1979) of the freedom and independence in international relations. It can be also seen and explained by Israeli diplomacy desire to look for partners among those states “who are able to look at Israel beyond the Israeli – Arab (especially Palestinian) conflict (MFA, 2018).

And finally, internationalization is also about attracting foreign (international) investment in the innovative sectors of the Israeli economy. When defining the conditions and parameters of the development of an economy based on new technologies, often the attention is paid to the model of financing the innovations. Nowadays the major sources of R&D financing in Israel are a combination of business enterprise and foreign sectors (in 2012: 84%) and the combination of government and higher education sectors (12%). The foreign financing component alone reached 49%. in 2012 (UNESCO, 2016). We can use the above as evidence that Israel’s innovation ecosystem relies on foreign multinationals and large corporate R&D investors. Indeed, an impressive number of multinational companies have set their sights on Israel, having R&D centers there. Amongst them are: IBM, Motorola, Microsoft, Facebook, Apple, General Motors, Google, Microsoft, Cisco and Hewlett Packard but also Siemens and Samsung (Foreign Investments and Industrial Cooperation Authority 2016, p. 2, 8–11). So we observe in Israel a progressively rising set of factors and conditions which attracts and facilitates investment of global firms in this country. This is generally based on government incentives and the availability of high-level human capital.

One of the key factors of the high-technology sector development in Israel over the past decades is the constantly increasing availability of venture capital (VC). According to the Global Competitiveness Index 2017–2018, Israel is ranked at 2nd place, right after the US, in terms of VC availability (World Economic Forum 2018). To encourage investors in eligible VC funds, the Israeli government has introduced several mechanisms including the 1993 Yozma program which allowed tax exemption on the income generated from investment in the Israeli IT industry. At the end of 2016, the Law for Encouragement of Capital Investments was amended to reduce corporate tax for high-tech companies from 25 percent to 6–12 percent, depending on the nature of the company. It also instituted additional tax benefits on dividends and capital gains tax (IIA 2018). In 2016, there were about 50 active venture capital funds in Israel. What is more, between 2007–2016, a total of about US\$9.13 billion was raised by Israel’s venture capital industry (LegCo 2018, p. 6). Finally, the Israeli economic growth strategy aims to increase exports, mostly by tax exemptions and less by manipulating the currency exchange rate.

Summing up this section, one can recall the outcomes of empirical research conducted by the Samuel Neaman Institute. According to the authors of the report, the innovation process in Israel is driven by six major factors in the following order: 1. Government programs for

supporting innovation and constant government investment in basic research; 2. Private and public sector activities for supporting innovation; 3. Cooperation between the private and public sector in supporting technological innovation; 4. Government investments for the creation of human capital; 5. Creating demand in the private sector, increasing demand for technological development in biomedicine and biotechnology; 6. National and international research funds, government and international funds for research (Frenkel, et al. 2011, p. 6,8).

The above quoted research findings together with a tentative analysis of these sections proves the key role of the government in the innovative process. The state authorities not only initiate and shape the directions and conditions of the innovation policy, but without constant financial, legal and also political (in the home and external / foreign policy) support, the success of the innovative private sector would not be possible. Considering the above, it can be said that innovativeness in Israel can be seen as an instrument, not a goal itself.

Achievements and benefits vs. challenges and disadvantages of the Israeli innovation policy

Achievements and benefits

As discussed above a crucial element of the strategy of ‘economic independence’ or better to say ‘the strategy of reducing the interdependence’ and in some cases ‘dependence’, was to become a global innovative player. Israel aimed at becoming a provider / supplier of advanced solutions, popular high technologies and innovative products. In other words, Israel in the global political and economic competitive game has become rather ‘giver’ than ‘taker’ – this has eventually decreased its dependence on other players and increased the dependence of others on Israel. Just to mention the nature of the arms trade, which creates a specific relation between exporter and importers. A similar, but not identical, mechanism applies to building up complex relationships between Israel and its partners when it comes to natural resources supplies (e.g. Israeli export of LNG or desalinated water).

To illustrate the achievements of Israeli economic policy, to a large extent based on hi-tech industry, both in its external and internal dimension, one can start with pointing out major indicators of the success of Israeli ‘hawkish neoliberalism’. First, as A. Krampf accurately noted “in the year 2014, the current account surplus of Israel surpassed US\$10 billion, demonstrating that Israel had turned from a chronic current account deficit country into a surplus country” (Krampf 2018). Second, Israel’s external debt accounted for 27.6 % of the country’s nominal GDP in 2016 (CEIC 2017), which is a remarkable feat given the fact that at the same time the government debt to GDP ratio in the EU28 has been calculated at over 80% (Eurostat 2017). Thirdly, in 2017 the foreign exchange reserves held by the Bank of Israel exceeded US\$100 billion (Krampf 2018). And finally, Israel is the 37th largest export economy in the world (OECD 2018). Though in 2016, Israel exported less than it

imported, which resulted in a negative trade balance of 6,592million of dollars, the directions and structure of the trade exchange can be perceived as beneficial for the national Israeli economic system (CBS 2017). As for the other macroeconomics parameters and trends which may characterize the Israeli economy, the GDP in Israel in recent years has risen significantly. Data shows that between the years 2003 and 2013, GDP grew by 36%, while the GDP per capita rose by 23% (UNESCO 2016, p.27).

The circumstances and factors mentioned in the above, are not only affecting, but even co-creating the position of Israel on the international stage. Israel aims to become a state that sets and shapes the conditions of international political and economic relations, rather than a country who is supposed to adjust to it. The strong economic performance and success in technological innovativeness helps Israel to improve the international image of the country in many ways. First, Israel is perceived as a reliable, stable partner in business (especially in trading). Secondly, Israel and Israelis are seen as suppliers of knowledge and technologies, and are therefore an attractive partner in R&D international scientific consortia, or purely commercial (for example selling the technologies⁷). Thirdly, Israelis found a brilliant way to link Israeli experiences in fighting the fundamental Islamic terror and being a provider of technologies in the realm of security (including cybersecurity) with the image and, consequently, design brand of a country who struggles for values of a western civilization. Surprisingly, from a state which has been associated with being a threat to international peace and security by western societies (mostly European) in the first decade of 2000's (The Guardian 2003), Israel has managed to break down this image. It is argued that the turning point which facilitated the changes were the terrorist attacks in Europe (inter alia in 2015 in Paris) and the activity of the so called Islamic State (Szydzisz 2017, p. 211–212). Additionally, in the past few years Israel has managed to separate the issue of the conflict with Palestinians from the diplomatic dialogue conducted in the framework of bilateral and even multilateral relations. Sometimes Israel even succeeded in presenting it as an internal (not international) problem, and to thus isolate it from the agenda of international (mostly bilateral) discourse. Recently, Israeli diplomacy was mostly successful with several efforts to shape the international security discourse on the situation in the Mediterranean and Middle East regions and Israel's roles in it. This has been done by underlining the Israeli struggle to eliminate the existential threats which were addressed from the neighbourhood. This threat is a shared concern of Israel and European states, as long as the situation in Middle East remains unstable, shaped by radical Islamic movements and resulting in terrorist attacks and waves of Arab migrants to Europe. Paradoxically, the combination of the briefly described circumstances is improving the international recognition and legitimacy of Israel.

⁷ E.g.: Polish power grid operator PSE signed a contract with Israel Electric Corporation Limited on cooperation in the field of cyber threats in the energy sector. In: Businessinsider (2018). *Polish power grid operator to work with Israeli utility on cyber-security*, 30.01.2018, <http://www.businessinsider.com/r-polish-power-grid-operator-to-work-with-israeli-utility-on-cyber-security-2018-1?IR=T>

Challenges and disadvantages

Israeli innovation policy achievements and their direct and indirect outcomes might be seen as very successful. Nevertheless, the policy itself as described and characterized in this paper has several, not necessarily expected, side effects. Israel's high economic performance is to be explained by the dominance of the high-technology sectors, in particular the ICT manufacturing and services sectors. However, as mentioned at the beginning of this paper, innovative sectors of Israel's economy are only small piece of the country's economic system. The traditional industry and service sectors are much larger. The model of economic growth based on exclusive high-tech industry, resulted in the unsustainable, dual economic structure of the labor market. On one hand there is a group of workers who are concentrated in the Israeli metropolitan area (in and around Tel Aviv) employed in innovative technological sectors. On the other hand, there is a poorly paid labor force living mostly on the periphery. The disproportion in incomes is not the only serious socio-economic consequence of the specific dual structure of labor market (USISTC 2008; UNESCO, 2016). It can be argued that the neoliberal, nationalist model of the Israeli economy causes insufficient inclusiveness and more, it is one reason for the deepening and strengthening poverty and inequality in Israel. Israel's economic system suffers from a high level of inequality, which refers mostly to inequality in income, rather than in life expectancy or education. Finally, the outcome of the Israeli hi-tech export oriented economic strategy is a growing a level of export concentration. About 65% of goods and services exported from Israel have been manufactured by companies with a high level of innovation (mainly from the hi-tech, pharmaceutical and chemical industries). Remembering the fiscal privileges *inter alia* tax exemptions.

In the light of this analysis another issue needs to be questioned; namely how Israelis want to preserve and maintain the country's leadership position in R&D international market. To do so, bearing in mind all the limitations and dangers (including those geopolitical), Israeli policy makers must first address the need to reinforce the human capital development. If there isn't a dramatic increase in the number of people employed in the hi-tech industry, the Israeli economy will lose momentum (IIA 2017b). According to the Israel Innovation Authority's report, half-a-million additional employees in the innovation industry will be required within a decade (doubling the current number). This applies mostly to the skilled workforce in hi-tech (Ibid). However such a specialist can easily find a well-paid job or start their business elsewhere – not necessarily in Israel. The power of attractiveness (in terms of living standards, security and welfare) of other innovative economies (e.g. Germany, U.S.A. Canada) might be another advantage for Israel – this time not strengthening but harming the national economic system.

Considering the above side effects of Israeli economic strategy, we can assume that the primary aim of state authorities is not to provide economic welfare and social justice to every citizen, but to provide security to the nation. It can be said in Israel upgrading the national interest over the preferences of individual citizens or social group inequality and

asymmetric distribution of benefits from being the innovative power, is to big extent accepted and legitimized. This coherently coexists with the neoliberal economic principles which are focused on economic rationality to maximize the benefits and minimalize the cost, or in other words, to have more for less. So to upgrade the state position in the international arena and to strengthen the Israel influence on the international economic and political process, the Israeli government needs to attract foreign capital and create a special kind of interdependence between the market players and its own economy, based on the advantages of the second.

Conclusion

As has been argued in the paper, efficiency in the field of innovation (especially in developing innovative technologies) is one of the pillars of the Israeli strategy of increasing competitiveness and even competitive advantage in the international arena. This is being achieved through technological advancement, which is a result of the effective innovation policy and the functionality of the national innovation ecosystem. However, developing the national economy through innovativeness is not a goal itself, it is subordinated to the implementation of political goals. So, it can be said, the Israeli innovative economy is an instrument for the implementation of the state's strategic goals in regional and global geopolitical rivalry. Israel, thanks to the technological advancement and high level of competitiveness is among a small group of countries controlling globalization processes. Israel has established itself as one of the most technologically advanced countries in the world and a global innovation hub. It is claimed that the success of Israeli economy is a result of strong government-led policies. Moreover, strategies and actions taken by the rulers in Israel (who, in recent years, are becoming more and more involved in shaping economic processes in the country and abroad) confirm the validity of K. Waltz's following assumptions: Firstly, because governments intensified activity in economic affairs, interdependence has become less of an autonomous force in international politics; Secondly, states with larger GDPs are rarely dependent on others, while a number of states are heavily dependent on them (Waltz 1999, p.698). It seems that the case of Israel is a good example of this regularity. As the paper shows Israel is struggling to decrease the level of international dependency using the economic means.

The shape and content of the Israeli innovation ecosystem reflects the political strategy of the state. Most of all the core element of the strategy is the security concerns, which are not necessarily coherent with the social and economic needs of the majority of Israelis. In light of this analysis, the disadvantages of the Israeli economic system described above are not an unintended side effect of the government's innovation policy or its immaturity. Simply, it can be considered as being a result of state economic policy and rather a legitimate (also by the society) cost of geopolitical and geoeconomic strategy. Israelis do legitimize the disadvantages of the country's economic situation, though they tend to complain about it very often. However, they believe that the unsustainable distribution of benefits from

being an innovative power is related to the security strategy. The specific version of Israeli national neoliberalism seems to be quite functional and so far there are no serious debates or claims to considerably change it or replace it. The philosophy of the Israeli political and economic strategy is based on the assumption that the primary goal of the state's policies is not welfare at first but security. As A. Krampf put it "Israel is rich country with poor citizens", but state richness is not to make people happy, rather it is to make them feel secure. As long as the security narrative will be present and well-founded in Israeli public discourse, socio-economic preferences of the citizens will remind marginalized.

References:

- Breznitz, D., & Ornston, D. (2012). "The Revolutionary Power of Peripheral Agencies: Explaining Radical Policy Innovation in Finland and Israel". *Carlo Alberto Notebooks*, 287. Retrieved from: <http://www.carloalberto.it/assets/working-papers/no.287.pdf>
- Broude, M., Deger, S., & Sen, S. (2013). "Defence, innovation and development: the case of Israel", *Journal of Innovation Economics & Management*, 2(12), pp. 37–57.
- Businessinsider (2018). Polish power grid operator to work with Israeli utility on cyber-security, 30.01.2018, Retrieved from: <http://www.businessinsider.com/r-polish-power-grid-operator-to-work-with-israeli-utility-on-cyber-security-2018-1?IR=T>
- Casadella, V., Uzunidis, D., & Liu Z. (2015). *Innovation Capabilities and Economic Development in Open Economies*, ISTE Ltd. & John Wiley and Sons Inc, London.
- CBS (2017). *Imports and exports of goods and services*, 30.08.2017, Central Bureau of Statistics. 23.01.2018. Retrieved from: http://www.cbs.gov.il/shnaton68/st16_01.pdf
- CEIC (2017). *Israel External Debt: % of GDP*, CEIC – A Euromoney Institutional Investor Company. Retrieved from: <https://www.ceicdata.com/indicator/israel/external-debt--of-nominal-gdp>.
- Cornell University, INSEAD, & WIPO (2017). *The Global Innovation Index 2017: Innovation Feeding the World*, Ithaca, Fontainebleau, and Geneva, Retrieved from: <https://www.globalinnovationindex.org/>.
- Edler, J., & Fagerberg, J. (2017). "Innovation policy: what, why, and how" *Oxford Review of Economic Policy*, 33(1), pp. 2–23
- European Commission (2017). EU - Israel Research and innovation cooperation - 20 years of success, partnership and friendship, 12.01.2017. Retrieved from: <http://ec.europa.eu/research/iscp/index.cfm?pg=israel>.
- Eurostat (2017). *Government finance statistics*, 23.10.2017. Retrieved from: http://ec.europa.eu/eurostat/statistics-explained/index.php/Government_finance_statistics.
- Frascati, M. (2015). *Proposed Standard Practice for Surveys on Research and Experimental Development*, 6th edition. The Measurement of Scientific, Technological and Innovation Activities. Paris: OECD Publishing.
- Frenkel, A., Shefer, D., & Roper, S. (2003), "Public policy, locational choice and the innovation capability of high-tech firms: A comparison between Israel and Ireland", *Regional Science*, 82(2), pp 203–221.
- Frenkel, A., Maital, S., Leck, E. Getz, D., & Gilad, V. (2011). *Towards Mapping National Innovation Ecosystem: Israel's Innovation ecosystem*, Samuel Neaman Institute. Retrieved from: <https://www.neaman.org.il/EN/Toward-Mapping-National-Innovation-Ecosystems-II-Innovation-Ecosystem2>

- Foreign Investments and Industrial Cooperation Authority (2016). *R&D Centers Investment Models in Israel*, Ministry of Economy and Industry, December 2016, Retrieved from: http://www.investinisrael.gov.il/resources/2017/R_D.pdf
- Guardian (2003). *EU poll sees Israel as peace threat*, 03.11.2003. Retrieved from: <https://www.theguardian.com/world/2003/nov/03/eu.israel>.
- Hall, B.H., & Rosenberg, N. (2010). *Handbook of the Economics of Innovation*. Oxford: North-Holland.
- Israel 21 (2018, January 8). "Israeli tech powers major wave-energy station in Ghana." Retrieved from: <https://www.israel21c.org/israeli-tech-powers-major-wave-energy-station-in-ghana/>.
- Israel Innovation Authority (2017a). *About the Israel Innovation Authority*. Retrieved from: http://www.matimop.org.il/about_authority.html
- Israel Innovation Authority (2017b). *Israel Innovation Authority Report 2017*. Jerusalem: IIA. Retrieved from: <http://economy.gov.il/English/NewsRoom/PressReleases/Documents/2017IsraelInnovationAuthorityReport.pdf>.
- Israel Innovation Authority (2018). *Innovation in Israel 2017 – overview*. January 2018. Retrieved from: <http://innovationisrael-en.mag.calltext.co.il/?article=5>
- Israel-U.S. Binational Industrial Research and Development Foundation (BIRD) (2018). *What is BIRD?* <http://www.birdf.com/what-is-bird/>.
- Krampf, A. (2018). *The Israeli Path to Neoliberalism. The State, Continuity and Change*. London: Routledge.
- Legislative Council of the Hong Kong special Administrative Region of the Peoples Republic of China (LegCo) (2018). Fact Sheet. Innovation and technology development in Israel, FS05/16–17, 20.03.2017. Retrieved from: <https://www.legco.gov.hk/research-publications/english/1617fs05-innovation-and-technology-development-in-israel-20170320-e.pdf>.
- Lexology (2015, August 20). *New R&D law – more flexibility in supporting technological innovation*. Retrieved from: <https://www.lexology.com/library/detail.aspx?g=2ff68054-248a-40ad-b4e3-c8bdf50094fe>.
- Ministry of Aliyah and Integration (2018). *The Center for Absorption in Science*, 16.01.2018. Retrieved from: <http://www.moia.gov.il/ENGLISH/ABOUT/Pages/default.aspx>.
- Ministry of Foreign Affairs (MFA) (2018, June 21). Interview with senior official of the Israeli Ministry of Foreign Affairs, Jerusalem.
- Netanyahu, B. (2018, January 24). "Innovation nation". *The Economist*. Retrieved from: <http://www.theworldin.com/article/14441/edition2018innovation-nation>.
- Observatory of Economic Complexity (OEC) (2018). *Israel*. Retrieved from: <https://atlas.media.mit.edu/en/profile/country/isrl/>.
- Organisation for Economic Co-operation and Development (OECD) (2011), "Policies to Support Eco-innovation in Israel", Environment Directorate, OECD. Retrieved from: <https://www.oecd.org/israel/48354947.pdf>.
- Organisation for Economic Co-operation and Development (OECD) (2015). Researchers: total, per 1 000 employed, 2000–2015. Retrieved from: <https://data.oecd.org/rd/researchers.htm>.
- Paredes-Frigolett, H., & Pyka, A. (2017). "A model of innovation network formation", *Innovation. Organization & Management*, 19(2), pp.245–269.
- Pustovrh, A., & Jaklič, M. (2014). "National innovation policies in the EU: a fuzzy-set analysis", *Economic and Business Review*, 16(1), pp. 39–62.
- Rubin, T.H., Aas, T.H., & Stead, A. (2015). "Knowledge flow in Technological Business Incubators: Evidence from Australia and Israel", *Technovation*, 41–42, pp. 11–24.
- Senor, D., & Singer, S. (2009). *Start-up Nation: The Story of Israel's Economic Miracle*. Council of Foreign Relations Book.

- Spiegel, S.L. (2013). „Importing Innovation”, *The American Interest*, Vol. 8, No.6, June 12, 2013.
- Szydzisz, M. (2017). „Polityka zagraniczna Izraela wobec aktualnych wydarzeń na Bliskim Wschodzie”, pp. 209–228. In P. Matera, M. Pietrasiak, R. Bania & M. Setlmach, *Badanie polityki zagranicznej państwa*. Warszawa: Rambler Press.
- Technion (2018). *Five thousand in attendance for groundbreaking of Guangdong Technion Israel Institute of Technology*. Retrieved from: <https://www.technion.ac.il/en/launch-of-first-israeli-university-in-china-five-thousand-in-attendance-for-groundbreaking-of-guangdong-technion-israel-institute-of-technology/>
- Trajtenberg, M. (2005). *Innovation Policy for Development: an Overview*, Paper prepared for the LAEBA 2005 second annual meeting, Buenos Aires, Argentina, November 2005, Retrieved from: <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.329.9364&rep=rep1&type=pdf>.
- United Nations Development Programme (UN DP) (2018). *Human Development Report 2016*, Retrieved from: <http://hdr.undp.org/en/countries/profiles/ISR>
- UNESCO (2016). “Mapping Research and Innovation in the State of Israel”. In E. Leck, G.A. Lemarchand & A. Tash, (Eds.), *GO SPIN Country Profiles in Science, Technology and Innovation Policy vol. 5*. Paris: United Nations Educational, Scientific and Cultural Organization.
- US - Israel Science and Technology Foundation (USISTC) (2008). *Israel 2028. Vision and Strategy for Economy and Society in a Global World*, March 2008, Retrieved from: <http://www.usistf.org/wp-content/uploads/2014/03/Israel-2028.pdf>.
- Waltz, K.N. (1979). *Theory of international politics*. Addison-Wesley Pub. Co.
- Waltz, K.N. (1999). “Globalization and Governance”, *Political Science & Politics*, December, pp. 693–700.
- Waltz, K.N. (2000). “Structural Realism after the Cold War”, *International Security*, 25(1), pp. 5–41.
- Wonglimpiyarat, J. (2015). “Mechanisms behind the Successful VC Nation of Israel”, *The Journal of Private Equity*, 18(4) pp. 82–89.
- Wonglimpiyarat, J. (2016). “Government policies towards Israel’s high-tech powerhouse”, *Technovation*, 52–53, pp. 18–27.
- World Bank (2018). *Military expenditure (% of GDP)*. Retrieved from: <https://data.worldbank.org/indicator/MS.MIL.XPND.GD.ZS>
- World Economic Forum (2018). *Global Competitiveness Index 2017–2018 edition*, 12.01.2018. Retrieved from: <http://reports.weforum.org/global-competitiveness-index-2017-2018/countryeconomy-profiles/#economy=ISR>.

Authors

Dr Hab. Joanna Dyduch

University of Wrocław, Chair of European Studies.

Contact details: ul. Koszarowa 3, budynek 21, 51-149 Wrocław, Poland; e-mail: joanna.dyduch@uw.edu.pl.

Dr Karolina Olszewska

University of Wrocław, Institute of International Studies.

Contact details: ul. Koszarowa 3, budynek 21, 51-149 Wrocław, Poland; e-mail: karolina.olszewska@uw.edu.pl.